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Zoysiagrass in Florida[1]

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Zoysiagrasses (*Zoysia* spp.) were introduced into the United States from the Orient and provide attractive turf throughout much of the United States. Several species and varieties are used for residential and commercial landscapes, athletic fields, and golf course tees, fairways, and roughs. An established, well-managed zoysiagrass provides a high quality turf, but zoysiagrasses generally require a high level of maintenance. Improvements in zoysiagrass varieties, however, are a major objective of many turfgrass breeders. These improvements are aimed at maximizing the positive attributes of zoysiagrass, while minimizing the disadvantages.

Figure 1. Zoysiagrass.

Advantages

Zoysiagrasses are adapted to a variety of soils and have good tolerance to shade, salt, and traffic. They provide an extremely dense sod that resists weed invasion. Once established, the slow growth of some zoysiagrass varieties is an advantage because mowing frequency is reduced. When properly maintained, however, zoysiagrasses make excellent turf.

Disadvantages

The improved zoysiagrasses must be propagated vegetatively and some varieties are extremely slow to establish. For some varieties, two growing seasons may be required for coverage when propagated by plugging or sprigging; others establish much more rapidly. All zoysiagrasses form a heavy thatch that will require periodic renovation. Other disadvantages of the older varieties include slow recovery from damage, poor growth on compacted soils, high fertility requirements, and poor drought tolerance. Some varieties are also prone to damage by nematodes, hunting billbugs, and several diseases. Zoysiagrass also tends to form shallow roots and is weakened when grown in soils low in potassium. Due

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to toughness of leaves and stems, a reel mower will provide the best cut.

Cultivars

Several species and cultivars of zoysiagrasses can be used in Florida. These vary widely in leaf color, texture, and establishment rate.

Zoysia japonica

This species was introduced into the United States in 1895 and is commonly called Japanese or Korean lawngrass. It is a very coarse textured grass with hairy, light green leaves. Of all the zoysiagrasses, this species has a faster growth rate and exhibits excellent cold tolerance. *Zoysia japonica* is the only zoysiagrass for which seed is commercially available, however, the seeded varieties generally do not produce as high quality turf as do the vegetatively propagated varieties. They can be used for lawns or general turf areas where convenience of establishment by seed is more important than quality. Additionally, hunting billbugs and nematodes cause considerable damage to some varieties of this lawngrass.

Many cultivars of *Zoysia japonica* are available. They include:

Belaire is an improved *Zoysia japonica* developed in Maryland by the USDA and released in 1985. It is noted for its excellent cold tolerance and medium green color. Compared to 'Meyer', 'Belaire' has a more open growth habit, coarser leaf texture and faster establishment rate. Brown patch disease may be a problem for this variety.

Crowne is a coarse-textured vegetatively propagated clone of *Zoysia japonica* released by Texas A&M University. 'Crowne' is noted for its tolerance to low water use requirements, cold hardiness and rapid recuperative ability. It was released for used on home lawns, industrial parks, highway rights-of-way, and golf course rough areas. As with 'Palisades', nematode susceptibility is not known for this variety.

El Toro is also an improved *Zoysia japonica* released in 1986 from California. It resembles 'Meyer' but has a quicker establishment rate, improved cool-season color, better cold tolerance, and less thatch buildup. 'El Toro' is also reported to have early spring green-up, more shade tolerance, and improved resistance to rust disease.

Empire zoysiagrass is a native proprietary selection of *Zoysia japonica*. It it said to be dark green in color with a wide leaf blade and open growth habit. It has performed well in sandy and clay soil types with aggressive growth from its stolons and rhizomes, but can be mowed with a standard rotary mower due to its broader leaf and open growth habit.

Empress is another native proprietary selection of *Zoysia japonica*, however, unlike 'Empire', this grass was selected for its fine bladed texture, tight growth habit, and green color. 'Empire' is best suited for applications where a fine, small leaf, soft textured turf is desired such as home lawns, golf courses, parks, and sports fields.

Meyer zoysiagrass, also called Z-52 or 'Amazoy', is an improved selection of *Zoysia japonica* released in 1951. 'Meyer' is the zoysiagrass often advertised as the "miracle" grass in newspapers and magazines and has long been the standard zoysiagrass in use. It has a deep green color, medium leaf texture, and spreads much faster than other varieties, although it produces few rhizomes. 'Meyer' makes an excellent turf once established. It is less shade tolerant than 'Emerald', but is one of the most cold tolerant zoysiagrasses. Hunting billbugs and nematodes pose serious problems with 'Meyer', limiting its use in Florida.

Palisades is an improved *Zoysia japonica* that forms a medium to coarse-textured turf. Released by Texas A&M University, 'Palisades' produces a vigorous regrowth from stolons and rhizomes and is noted for its good winter hardiness, tolerance to low mowing, and good to excellent shade tolerance. It is said to be a low water user and has good salt tolerance. 'Palisades' is being marketed for home lawns and for use on golf courses. One concern with 'Palisades' is the lack of research information on nematode susceptibility.

Zoysia matrella

Also called Manilagrass, this species was introduced into the United States in 1912 from Manila (hence the name). It produces a finer and denser turf than *Zoysia japonica* but is less winter-hardy and slower growing. Manilagrass resembles bermudagrass in texture, color and quality and is recommended for a high-quality, high-maintenance turf where a slow rate of establishment is not a disadvantage. Some varieties of *Zoysia matrella* are highly susceptible to damage by nematodes.

Cashmere is a 1988 release from Pursley Turf Farms located in Palmetto, Florida. It is dark green, has a fine leaf texture and forms a dense turf. Its shade tolerance is not fully known, but it does lack cold hardiness, and is thus best adapted to the lower southern region.

Cavalier is another fine-textured *Zoysia matrella* cultivar and is appropriate for home lawns, sports fields, and golf course fairways and tees. A long-leafed variety, it is said to make a very attractive turf, especially during summer. It is rated as having good shade tolerance, good salt tolerance, and excellent fall color retention. In trials conducted at Texas A&M at Dallas, 'Cavalier' showed good resistance to fall armyworms and moderate resistance to tropical sod webworms. 'Cavalier' has done well in trials in Texas, the Midwest and mid-Atlantic regions, however, limited research has been conducted in Florida on this grass.

Diamond is an improved *Zoysia matrella* that is vegetatively propagated. It was released from Texas in 1996. 'Diamond' is distinguished from other zoysiagrasses by its fine texture, excellent salt and shade tolerance, and faster growth. It performs best when mowed at a height of 1/2-inch or less. In fact, 'Diamond' has been planted on several experimental golf greens mowed at 1/4-inch or lower. Like other zoysiagrasses, it has poor cold tolerance, which may limit its use in northern parts of the state and it is highly susceptible to tropical sod webworms.

Zoysia tenuifolia

Also called Mascarenegrass or Korean velvetgrass, this species is the finest textured and most dense zoysiagrass available. It has good wear tolerance but poor cold tolerance, and is only adapted to the central and southern areas of the state. It also produces an excessive thatch, giving it a puffy appearance.

Zoysiagrass hybrids

Emerald zoysiagrass is a selected hybrid between *Zoysia japonica* and *Zoysia tenuifolia* developed in Tifton, GA and released in 1955. This hybrid combines the winter-hardiness, color, and faster growth rate of one parent with the fine texture and density of the other parent. 'Emerald' resembles Manilagrass in color, texture, and density, but is faster-spreading and has a wider adaptation. 'Emerald' zoysiagrass is highly recommended for top quality lawns where time and money allow for adequate maintenance. 'Emerald' produces an excessive thatch layer and is susceptible to dollar and leaf spot. Brown patch disease also can occur.

Zoysia sinica--A new species for turf?

Seashore zoysiagrass (not to be confused with Seashore paspalum) is an obscure species that was previously not considered suitable for turf. However, breeding efforts have produced an improved cultivar 'J-14'. It most closely resembles Zoysia japonica as far as leaf texture, color, density, and general appearance are concerned. One major difference is that the seed for Seashore zoysiagrass is much easier to handle and appears to propagate better. 'J-14' is currently being tested at Gainesville and Milton.

Maintenance

Establishment

With one exception, zoysiagrasses must be planted vegetatively, by sod, plugs, or sprigs. *Zoysia japonica* is the only species for which seed is commercially available. Success with any propagation method is highly dependent on proper soil preparation.

Seeding

Establishing zoysiagrass from seed is increasing in popularity. The seed, however, is extremely sensitive to light and cannot be covered with soil.

Consequently, areas to be established by seed need to be covered with some type of erosion cloth to reduce any surface disruption caused by rain or irrigation. After seeding, frequent, light irrigations are necessary to keep the soil moist and encourage germination. Maintain this moisture regime until the planted area is completed covered.

Sodding

Sodding will produce an instant turf, as the entire area to be planted with grass material is covered. Sod should only be laid over bare moist soil with pieces laid in a staggered brick-like pattern and the edges fitted tightly together to avoid any open cracks. Rolling and watering thoroughly will insure good contact with the soil for fast rooting. Sodded areas should be watered at least twice per day with a 1/4 inch of water until the sod is held fast (usually 2 to 3 weeks) to the soil by new roots; then watering should be reduced to an as-needed basis.

Plugging

Because of the relatively slow establishment rate of zoysiagrass, plugs are usually planted on 6- to 8-inch centers. This means that plugs are planted every 6 inches in a row and rows are spaced 6 inches apart. Even with 6-inch spacing, at lease one full season will be required for complete coverage; longer for some varieties. Plugs should be tamped firmly into the soil and watered in. During grow-in, the soil should be kept moist until the grass is well rooted. Extra attention to weed control is necessary during this type of establishment.

Sprigging

Planting zoysiagrasses by sprigs is a laborious, but effective, method of establishment. Fresh sprigs with at least two or four nodes should be planted in rows that are 6 inches apart. Plant the sprigs end-to-end or no more than 6 inches apart in the row, and cover them with soil about one to 2 inches deep, leaving part of each sprig exposed to light. A roller can be used to press sprigs into the soil. Soil must be kept moist until plants initiate new growth and the area is completely covered.

Fertilizing

Proper fertilization is an important component of the best management practices of your turf. Fertilization and other cultural practices influence the overall health of the turf and can reduce or increase its vulnerability to many stresses, including weeds, insects, and disease.

Having soil tests done annually to determine the exact fertility need is advisable. Your local UF Cooperative Extension Service county office has instructions and bags for taking soil samples and submitting to the UF Extension Soil Testing Lab for analysis. These tests form the basis for your turf fertility program and recommendations from the soil tests should take precedence over recommendations given in publications or on fertilizer bags. In particular, phosphorous levels are best determined by soil testing. Since many Florida soils are high in phosphorous, little or no phosphorus may be needed for satisfactory turf growth. The exception to this may be during establishment.

In general, two weeks following complete spring green-up, apply a fertilizer at the rate of 1/2 (water-soluble) to 1 (slow-release) pound of nitrogen per 1000 square feet. The three numbers on a fertilizer bag refer to percent nitrogen, phosphorus, and potassium, respectively, in the bag. For example, a 50-pound bag of 16-4-8 contains 16% nitrogen or 8 pounds total nitrogen. This bag will fertilize 8000 square feet at the rate of 1 pound of nitrogen per 1000 square feet. To look their best, zoysiagrasses require frequent fertilization. They should receive 3 to 6 lbs. of nitrogen during the growing season in most situations. University of Florida guidelines for lawngrass fertility show a range of fertilizer rates over which a particular species may be successfully grown for various areas of the state. These ranges are included to account for individual homeowner preferences for low-, medium-, or high-input grass. Additionally, localized microclimate effects can have a tremendous effect on turfgrass growth, and a range of rates provides more opportunity to allow for these environmental variations. An example of this would be a typical home lawn that is partially shaded and partially sunny. The grass growing in the shade should receive lower rates of fertilizer than that

growing in full sun. The guidelines are also separated into three geographical locations statewide as indicatied in Table 1 and Table 2. All rates are in pouinds of nitrogen per 1000 square feet. For questions on how to apply these amounts, refert to the section in this book entitled Florida Fertilization.

Fertilizer should be applied to zoysiagrass in 3 to 6 applications from spring greenup through fall. Do not apply nitrogen too early in the growing season, particularly in north Florida, or subsequent frosts may damage the grass. Likewise, don't fertilize too late in the year, as this can slow regrowth the following spring. If applying water-soluble forms at the lower application rate, it will take more applications to apply the total amount of fertilizer needed for the year than if applying a slow-release fertilizer form.

Mowing

If fertilized as recommended, zoysiagrasses will require frequent mowing (e.g., weekly) during the summer to look their best. *Zoysia japonica* should be mowed every 7 to 10 days, or when it reaches a height of 3 to 4 inches. It should be mowed at a height of 2 to 3 inches with a rotary mower. 'Meyer' zoysiagrass looks best when cut at 1 to 2 inches every 10 to 14 days, or when it reaches a height of 2 to 2.5 inches, using a reel mower. 'Emerald' and Manilagrass should be cut with a reel mower at 1/2 to 1 inch every 10 to 14 days, or when they reach a height of 3/4 to 1.5 inches. Because zoysiagrass leaves are very coarse, they can be quite difficult to mow. A sharp, well-adjusted rotary or reel mower should be used.

Watering

Zoysiagrasses require watering especially if parasitized by nematodes, which greatly restrict the root system. During prolonged droughts, watering zoysiagrass every other day may be necessary. Irrigation on an as-needed basis is an excellent way to water any grass, provided the proper amount of water is applied when needed; not at a later or more convenient time. When using this approach, water at the first sign of wilt and apply 3/4 inch water per application.

Thatch Control

Zoysiagrasses typically develop a thick thatch layer in the years after establishment. This thatch must be controlled or removed mechanically to maintain a uniform grass appearance. This is most often done using a vertical mower or core aerator. Research on some of the newer fine-textured zoysiagrasses have shown good results with alternating conventional mowing and vertical mowing.

Pest Problems

Zoysiagrasses are troubled by several insects, diseases, and nematodes. Periodic control of one or more of these problems will be necessary to grow a high quality turf.

Insects

The most serious insect is the hunting billbug. Billbugs destroy and feed on roots and the grass dies in irregular shaped patches. Billbugs may require periodic chemical control. Lawn caterpillars may also damage zoysiagrasses.

Nematodes

Probably the most serious pests on zoysiagrasses are nematodes. These soilborne, microscopic worms attack the grass roots, and if not controlled, can ultimately kill the entire turf.

Diseases

Disease problems of zoysiagrass include dollar spot, brown patch and rust. These are generally suppressed in properly fertilized and watered turf.

Table 1.

Location[1]	N Fertility Guideline
North Florida	3-5
Central Florida	3-6
South Florida	4-6

[1]North Florida in this example is considered to be anything north of Ocala. Central Florida is defined as anything south of Ocala to a line extending from Vero Beach to Tampa. South Florida includes the remaining southern portion of the state.

Table 2. Calendar Guide to Annual Zoysiagrass Fertilization [2,3]

Maintenance Level	January	February	March	April	May	June	July	August	September	October	November
North Florida											
Basic			C		SRN				C		
Moderate			C		SRN		SRN		C		
High			C	N	SRN		SRN		C		
Central Florida											
Basic			C		SRN				C		
Moderate			C		SRN			SRN		C	
High		C		N	SRN		SRN		N		C
South Florida											
Basic			C		SRN		SRN			C	
Moderate		C		N		SRN		SRN			C
High		C		N	SRN		SRN		SRN		C

[2]For initial spring application, particularly in North Florida, the recommended time to fertilize is after the last frost rather than on a specific calendar date.
[3]C=complete fertilizer application (NPK); N=nitrogen application only; SRN=nitrogen only in a slow release form; Fe=iron application only.